

Skilled and Technical Sciences Programs of Study

Architecture and Construction Cluster				
Numbering Key	Program of Study	Introduction Course	Intermediate Course	Capstone Course
STS.HS.1	Architectural Design	100100 - Introduction to Skilled and Technical Sciences -OR- 090109 - Housing and Interior Design (FCS)	100140 - Architectural Design 1	100141 - Architectural Design 2
STS.HS.2	Construction	100100 - Introduction to Skilled and Technical Sciences -OR- 100405 - Electricity	100110 - Construction Trades 1 -OR – 016002 - Structural Systems (AG)	100120 - Construction Trades 2

Energy and Engineering Cluster				
Numbering Key	Program of Study	Introduction Course	Intermediate Course	Capstone Course
STS.HS.3	Engineering	103191 - Engineering Design and Systems Thinking -OR- 100100 – Introduction to Skilled and Technical Sciences	103192 - Engineering Problem Solving -OR- 103194 - Robotics	103193 – Systems Engineering and Project Management -OR- 103195 - Advanced Robotics
STS.HS.4	Energy	100406 – Fundamentals of Energy	100408 - Sustainable Energy	100407 – Physics and Mathematics of Energy

Manufacturing Cluster				
Numbering Key	Program of Study	Introduction Course	Intermediate Course	Capstone Course
STS.HS.5	Manufacturing	100100 - Introduction to Skilled and Technical Sciences -OR- 101920 – Manufacturing Processes – Woods -OR- 101400 – Manufacturing Processes – Metals -OR- 101950 – Manufacturing Processes - Plastics -OR- 100140 – Architectural Design 1	101920 – Manufacturing Processes – Woods -OR- 101400 – Manufacturing Processes – Metals -OR- 101950 – Manufacturing Processes - Plastics -OR- 100401 – Introduction to Electronics	101921 - Manufacturing Production - Woods -OR- *101922 - Advanced Manufacturing and Fabrication - Woods -OR- 101401 – Manufacturing Production - Metals -OR- *101402 - Advanced Manufacturing and Fabrication - Metals -OR- 101951 – Manufacturing Production - Plastics -OR- *101952 Advanced Manufacturing and Fabrication - Plastics -OR- 100402 – Advanced Electronics -OR- 101900 - Introduction to Mechatronics
STS.HS.6	Welding	100100 - Introduction to Skilled and Technical Sciences -OR- 101930 – Welding 1 -OR – 100140 – Architectural Design 1	101930 – Welding 1 – OR – 101940 – Welding 2 -OR- 016004 - Welding (AG) (Equivalent to Welding 1)	101940 – Welding 2 – OR – *101941 – Welding 3 -OR- 016005 - Metals and Fabrication (AG) (Equivalent to Welding 2)

Transportation, Distribution, and Logistics Cluster				
Numbering Key	Program of Study	Introduction Course	Intermediate Course	Capstone Course
STS.HS.7	TDL - Technician	101600 – Transportation 1 -OR- 100100 Introduction to the Built Environment -OR- 016003 Power and Technology (AG)	101620 - Transportation 2	101630 – Transportation 3 -OR- 101640 – Collision Repair
STS.HS.8	TDL – Supply Chain	101601 – Introduction to TDL	101610 - Distribution and Logistics	101650 - Business Logistics

Architecture and Construction Cluster

Architectural Design Program of Study

Standard/Indicator Number	STANDARDS	INDICATORS
	The Student Will Be Able To...	The Student Will Be Able To...
STS.HS.1.1	Identify safety guidelines.	Successfully complete written safety assessment.
STS.HS.1.1.a		Identify the consents necessary to enter a confined space on a construction site.
STS.HS.1.1.b		
STS.HS.1.1.c		Identify the requirements of Personal Protective Equipment (PPE).
STS.HS.1.2	Identify architectural career opportunities.	
STS.HS.1.2.a		Identify the primary duties and attributes of an architect or architectural technician.
STS.HS.1.2.b		Describe the various careers within the architectural profession (i.e. draftsman, designer, project manager, architect, landscape architect, and interior designer) and the training and certification needed for each.
STS.HS.1.2.c		Identify the relationships between all stakeholders involved in a construction project.
STS.HS.1.2.d		Identify how work varies with regard to site (i.e. confined spaces, outdoor areas, aerial space and a variety of climatic and physical conditions).
STS.HS.1.2.e		Identify positive work behaviors and personal qualities needed to be employable.
STS.HS.1.3	Analyze the historical beginnings of architecture.	
STS.HS.1.3.a		Identify design principles, elements, and architectural styles.

STS.HS.1.3.b		Identify the building materials, locations, and design that have historically influenced civil engineering and architecture.
STS.HS. 1.3.c		Relate the influence that historical buildings have on today's architecture.
STS.HS.1.3.d		Identify general categories of structural systems used in historical buildings.
STS.HS.1.4	Apply geometric object measurements to architecture.	
STS.HS.1.4.a		Define the characteristics of an equilateral triangle, isosceles triangle, square, parallelogram, hexagon, octagon, and circle and their application to architecture.
STS.HS.1.4.b		Calculate the surface area and perimeter of two- dimensional objects.
STS.HS.1.4.c		Calculate the volume and surface area of three- dimensional objects.
STS.HS.1.4.d		Calculate the roof slopes, light angles, ground surfaces, structural loads and heights of structures.
STS.HS.1.4.e		Interpret a design brief, including knowing the design problem, design statement and be able to list design constraints.
STS.HS.1.5	Identify site characteristics and how they affect building design and land development.	
STS.HS.1.5.a		Identify the impact of site development (I.e. storm water runoff, pedestrian and vehicular access).
STS.HS.1.5.b		Explain the purpose for the use of Low Impact Development techniques in site development.
STS.HS.1.5.c		Identify specifications and codes for a site design process.
STS.HS.1.5.d		Identify soil characteristics important to the design and construction of a building on the site.
STS.HS.1.6	Identify typical building design and construction methods and practices.	

STS.HS.1.6.a		Identify various digital drafting and modeling options (i.e. CADD/BIM).
STS.HS.1.6.b		Identify the components that comprise architectural construction (working) drawings.
STS.HS.1.6.c		Identify the types of materials, their properties and applications used in building construction.
STS.HS.1.6.d		Identify different types of fasteners, adhesives and finishes.
STS.HS.1.6.e		Identify the environmental impact of material usage.
STS.HS.1.7	Identify residential and commercial building systems.	
STS.HS.1.7.a		Describe how construction is affected by the availability, quality, and quantity of resources.
STS.HS.1.7.b		Identify typical utility services, transmission and usage measuring required for a residential and commercial building.
STS.HS.1.7.c		Identify code requirements and constraints as they pertain to the installation of services and utilities.
STS.HS.1.7.d		Identify the criteria and constraints to determine the size and location of new utility service connections.
STS.HS.1.7.e		Identify system designs to incorporate energy conservation techniques.
STS.HS.1.8	Create a cost and efficiency analysis.	
STS.HS.1.8.a		Compare and contrast the terms R-value and U-factor.
STS.HS.1.8.b		Create a cost estimate for a small construction project, including a detailed cost break-down.
STS.HS.1.8.c		Calculate the heat loss for a building envelope.
STS.HS.1.8.d		Calculate the overall R-value of a wall or roof section composed of multiple building components.
STS.HS.1.8.e		Identify principles of sustainable design.
STS.HS.1.9	Identify current local and national building codes.	

STS.HS.1.9.a		Describe how current building codes determine the type, sizing, and placement of site features (i.e. parking lots, and entrances and exit roads, pedestrian and handicapped access, and storm water facilities).
STS.HS.1.10	Apply conventional General Drafting Standards used in architectural drafting situations.	Identify the protocol used in crisis management (i.e. an employee injury, equipment damage, and a collapse on a project of people or materials).
STS.HS.1.10.a		Identify terms and definitions commonly used in the architectural profession including detail drawings, working drawings and drafting.
STS.HS.1.10.b		Define the function and graphical characteristics of each line in the Alphabet of Lines.
STS.HS.1.10.c		Describe the orthographic elevation projection.
STS.HS.1.10.d		Create different views such as floor plans, elevations, sections, site, and perspectives.
STS.HS.1.10.e		Apply dimensional information and general notes in architectural views and plans.
STS.HS.1.10.f		Apply schedules such as doors, windows and rooms in architectural views and plans.
STS.HS.1.10.g		Describe the components that comprise architectural construction (working) drawings.
STS.HS.1.10.h		Indicate plan review requirements needed to obtain a building permit.
STS.HS.1.11	Communicate design solutions.	
STS.HS.1.11.a		Prepare design ideas using architectural terminology for a presentation.
STS.HS.1.11.b		Deliver an oral presentation with accompanying visuals featuring both physical and digital work.
STS.HS.1.11.c		Develop and maintain an architectural portfolio that includes physical and digital works.
STS.HS.1.11.d		Create shaded and rendered presentation drawings.

Architecture and Construction Cluster

Construction Program of Study

Standard/Indicator Number	STANDARDS	INDICATORS
	The Student Will Be Able To...	The Student Will Be Able To...
STS.HS.2.1	Apply safety principles, practices and guidelines to the work environment.	Successfully complete written safety assessment.
STS.HS.2.1.a		Apply the requirements of safety glasses and other Personal Protective Equipment (PPE).
STS.HS.2.1.b		
STS.HS.2.1.c		Apply the safe use of tools, machines, and equipment in alignment with industry standards to maintain a safe workplace. Describe the role of government agencies in providing a safe workplace.
STS.HS.2.1.d	Investigate career opportunities in the construction industry.	
STS.HS.2.2		
STS.HS.2.2.a		Identify the responsibilities and characteristics of professionals in the construction industry.
STS.HS.2.2.b		Identify employment trends in various construction sectors (residential, commercial, industrial, energy, green technologies, etc.).
STS.HS.2.2.c		Describe work behaviors needed to be employable.
STS.HS.2.2.d		Identify the training, education, certification and licensing requirements for various careers in the construction industry.
STS.HS.2.3		
STS.HS.2.3.a		Accurately interpret construction terminology, plans, drawings and schedules.
STS.HS.2.3.b	Demonstrate use of construction communications.	Develop a flowchart of project schedule.
STS.HS.2.3.c		Develop a schedule materials in proper sequence.

STS.HS.2.4	Identify building codes and permitting processes.	
STS.HS.2.4.a		Identify local, state and national building regulations and codes.
STS.HS.2.4.b		Describe the requirements needed to obtain a building permit.
STS.HS.2.4.c		Identify appropriate building inspections.
STS.HS.2.5	Summarize building systems and components.	
STS.HS.2.5.a		Describe the building systems needed to complete a construction project.
STS.HS.2.5.b		Describe the building components needed to complete a construction project (i.e. trusses, joists, beams, etc.).
STS.HS.2.5.c		Identify the types and sizes of construction materials needed to complete a construction project.
STS.HS.2.5.d		Identify different types of fasteners, adhesives and finishes needed to complete a construction project.
STS.HS.2.5.e		Identify green building techniques.
STS.HS.2.6	Demonstrate the installation of construction sub-systems.	
STS.HS.2.6.a		Accurately use math functions and formulas to complete job/workplace tasks.
STS.HS.2.6.b		Correctly and accurately use tools and equipment to perform material takeoff (MTO) to drawings and specifications.
STS.HS.2.6.c		Construct structural, mechanical and finish sub-systems correctly to meet current local, state, and national codes.

Energy and Engineering Cluster

Energy Program of Study

Standard/Indicator Number	STANDARDS	INDICATORS
	The Student Will Be Able To...	The Student Will Be Able To...
STS.HS.3.1	Apply safety principles, practices and guidelines to the work environment.	
STS.HS.3.1.a		Apply the requirements of safety glasses and other Personal Protective Equipment (PPE) in the workplace.
STS.HS.3.1.b		Demonstrate the safe use of tools, machines, and equipment in alignment with industry standards.
STS.HS.3.1.c		Analyze the role of government agencies in providing a safe workplace.
STS.HS.3.2	Investigate career opportunities in the energy field to gain knowledge for informed career decisions.	
STS.HS.3.2.a		Identify the responsibilities of professionals in the energy industry.
STS.HS.3.2.b		Identify opportunities and employment trends in various energy sectors.
STS.HS.3.2.c		Identify the training, education, certification and licensing requirements for occupational choices.
STS.HS.3.3	Explain the history of energy and energy generation.	
STS.HS.3.3.a		Summarize the general history and key events in electric power generation and distribution.
STS.HS.3.3.b		Explain the history of fluid and liquid fuel production and distribution.

STS.HS.3.4	Classify the various types of energy and their uses.	
STS.HS.3.4.a		Evaluate the seven forms of energy.
STS.HS.3.4.b		Assess energy transformations in various settings. (ex. home, farm, car, county fair, ecosystem).
STS.HS.3.4.c		Compare and contrast renewable and non-renewable energy.
STS.HS.3.4.d		Identify the law of conservation of energy.
STS.HS.3.4.e		Explain the purpose of regulatory bodies within the energy industry.
STS.HS.3.5	Differentiate between types of energy storage and distribution methods.	
STS.HS.3.5.a		Explain the components of an energy delivery system.
STS.HS.3.5.b		Identify key pieces of equipment that are used in the distribution and storage of fluid fuels and electrical power (i.e. pipelines, tank farms, unit trains, super-tankers, transmission lines, towers, generating stations, sub-station, etc.).
STS.HS.3.5.c		Compare and contrast centralized power generation and distributed generation.
STS.HS.3.6	Employ various measures of energy.	
STS.HS.3.6.a		Calculate equations using Ohm's Law.
STS.HS.3.6.b		Calculate equations using thermal energy formulas.
STS.HS.3.6.c		Utilize energy related measurement tools in appropriate scenarios.
STS.HS.3.7	Plan, build and maintain an energy related product or structure.	
STS.HS.3.7.a		Create sketches and plans for an energy related product or structure.

STS.HS.3.7.b

Determine structural requirements, specifications and estimate costs of structures.

STS.HS.3.7.c

Interpret plans to construct, maintain, or repair energy related product or structure.

Energy and Engineering Cluster

Engineering Program of Study

Standard/Indicator Number	STANDARDS	INDICATORS
	The Student Will Be Able To...	The Student Will Be Able To...
STS.HS.4.1	Apply safety principles, practices and guidelines to the work environment.	
STS.HS.4.1.a		Successfully complete written safety assessment.
STS.HS.4.1.b		Apply the requirements of safety glasses and other Personal Protective Equipment (PPE).
STS.HS.4.1.c		Apply the safe use of tools, machines, and equipment in alignment with industry standards to maintain a safe workplace.
STS.HS.4.2	Investigate careers in the engineering field to gain knowledge for informed career decisions.	
STS.HS.4.2.a		Identify opportunities and employment trends in various engineering sectors.
STS.HS.4.2.b		Identify training, education, certification and licensing requirements for occupational choice.
STS.HS.4.3	Employ engineering design process principles to solve an engineering problem.	
STS.HS.4.3.a		Define an engineering problem and research possible solutions.
STS.HS.4.3.b		Use basic technical sketching and drawing skills, engineering notebook standards and engineering protocols to document research and solutions.
STS.HS.4.4	Build an engineering related product or structure.	
STS.HS.4.4.a		Determine structural requirements, specifications and estimate costs for the products or structures.

STS.HS.4.4.b		Accurately follow plans to construct an engineering related product or structure.
STS.HS.4.5	Describe the functions of a basic robot.	
STS.HS.4.5.a		Identify basic programming concepts: structures, variables, constants and logical operators.
STS.HS.4.5.b		Identify various aspects of robotics in industry.
STS.HS.4.6	Design and assemble robots that are functionally and structurally sound.	
STS.HS.4.6.a		Generate a solution for a robot to overcome a physics challenge.
STS.HS.4.6.b		Construct a fully functioning robot that has proof of concept through engineering notebook protocols.
STS.HS.4.6.c		Assemble drive trains that utilize different gear ratios to understand mechanical setups.

Manufacturing Cluster

Manufacturing Program of Study

Standard/Indicator Number	STANDARDS	INDICATORS
	THE STUDENT WILL BE ABLE TO...	THE STUDENT WILL BE ABLE TO...
STS.HS.5.1	Apply safety principles, practices and guidelines to the work environment.	
STS.HS.5.1.a		Successfully complete written safety assessment.
STS.HS.5.1.b		Apply the requirements of safety glasses and other Personal Protective Equipment (PPE).
STS.HS.5.1.c		Apply the safe use of tools, machines, and equipment in alignment with industry standards to maintain a safe workplace.
STS.HS.5.1.d		Describe the role of government agencies in providing a safe workplace.
STS.HS.5.2	Investigate career opportunities in the manufacturing industry.	
STS.HS.5.2.a		Identify the responsibilities and characteristics of professionals in the manufacturing industry.
STS.HS.5.2.b		Identify employment trends in manufacturing.
STS.HS.5.2.c		Describe work behaviors needed to be employable.
STS.HS.5.2.d		Identify the training, education, certification and licensing requirements for various careers in the manufacturing industry.
STS.HS.5.3	Demonstrate use of manufacturing communications.	
STS.HS.5.3.a		Interpret manufacturing terminology, plans, sketches, drawings and schedules.
STS.HS.5.3.b		Develop a flowchart of a project schedule.

STS.HS.5.3.c		Develop a schedule of materials in proper sequence.
STS.HS.5.4	Identify the materials, tools and equipment needed to manufacture a product.	
STS.HS.5.4.a		Determine types of materials, fasteners, adhesives and finishes needed to produce a specific product.
STS.HS.5.4.b		Determine the correct tools and equipment needed to produce a specific product.
STS.HS.5.5	Manufacture a product using manufacturing technology.	
STS.HS.5.5.a		Correctly use math functions and formulas to complete job/workplace tasks.
STS.HS.5.5.b		Correct and accurately use tools and equipment to perform manufacturing operations according to drawings and specifications.

Manufacturing Cluster

Welding Program of Study

Standard/Indicator Number	STANDARDS	INDICATORS
	THE STUDENT WILL BE ABLE TO...	THE STUDENT WILL BE ABLE TO...
STS.HS.6.1	Apply safety principles, practices and guidelines to the work environment.	
STS.HS.6.1.a		Successfully complete written safety assessment.
STS.HS.6.1.b		Apply the requirements of safety glasses and other Personal Protective Equipment (PPE).
STS.HS.6.1.c		
STS.HS.6.1.d		Apply the safe use of tools, machines, and equipment in alignment with industry standards to maintain a safe workplace.
STS.HS.6.2	Investigate career opportunities in the welding industry.	Describe the role of government agencies in providing a safe workplace.
STS.HS.6.2.a		Identify the responsibilities and characteristics of professionals in the welding industry.
STS.HS.6.2.b		Identify employment trends in welding.
STS.HS.6.2.c		Describe work behaviors needed to be employable.
STS.HS.6.2.d		Identify the training, education, certification and licensing requirements for various careers in the welding industry.
STS.HS.6.3	Demonstrate use of welding communications.	
STS.HS.6.3.a		Accurately interpret welding terminology, plans, sketches, drawings and schedules.
STS.HS.6.3.b		Develop a flowchart of a project schedule.
STS.HS.6.3.c		Develop a schedule of materials in proper sequence.

STS.HS.6.4	Identify the materials, tools and equipment needed to manufacture a product.	
STS.HS.6.4.a		Determine types of materials, fasteners, adhesives and finishes needed to produce a specific product.
STS.HS.6.4.b		Determine the correct tools and equipment needed to produce a specific product.
STS.HS.6.5	Produce a product using welding technology.	
STS.HS.6.5.a		Accurately use math functions and formulas to complete job/workplace tasks.
STS.HS.6.5.b		Correctly and accurately use tools and equipment to perform welding operations according to drawings and specifications.
STS.HS.6.5.c		Perform metal cutting operations using various methods (i.e. oxy-acetylene, mechanized oxyfuel gas, plasma arc and manual air carbon arc).
STS.HS.6.5.d		Weld using various methods of welding (i.e. gas metal arc welding, GMAW-S, GMAW spray transfer, flux core arc welding, gas tungsten arc welding, shielded metal arc welding, oxy-acetylene) and using various positions (i.e. flat, horizontal, vertical up, vertical down, and overhead).

Transportation, Distribution and Logistics Career Cluster

TDL Technician Program of Study

Standard/Indicator Number	STANDARDS	INDICATORS
	THE STUDENT WILL BE ABLE TO...	THE STUDENT WILL BE ABLE TO...
STS.HS.7.1	Apply safety principles, practices and guidelines to the work environment.	
STS.HS.7.1.a		Successfully complete written safety assessment.
STS.HS.7.1.b		Apply the requirements of safety glasses and other Personal Protective Equipment (PPE).
STS.HS.7.1.c		Apply the safe use of tools, machines, and equipment in alignment with industry standards to maintain a safe workplace.
STS.HS.7.1.d		Describe the role of government agencies in providing a safe workplace.
STS.HS.7.2	Investigate career opportunities in the transportation industry.	
STS.HS.7.2.a		Identify the responsibilities and characteristics of professionals in the transportation industry.
STS.HS.7.2.b		Identify employment trends in the transportation industry.
STS.HS.7.2.c		Describe work behaviors needed to be employable.
STS.HS.7.2.d		Identify the training, education, certification and licensing requirements for various careers in the transportation industry.
STS.HS.7.3	Describe the systems and components used in the transportation technician industry.	
STS.HS.7.3.a		Describe the function and operation of the systems of a vehicle or equipment (i.e. mechanical, electrical, fuel, suspension, etc.) and the components needed to operate those systems.

STS.HS.7.3.b		Demonstrate the use of communication tools (i.e. manuals, on-line specification and service procedures, etc.) used in the transportation service industry.
STS.HS.7.4	Diagnose and repair the systems and components of a vehicle or equipment.	
STS.HS.7.4.a		Determine the correct tools and equipment used for the diagnosis, service and repair of the systems and components.
STS.HS.7.4.b		Determine the different types of fasteners, adhesives and finishes needed to complete service and repair of the vehicle or equipment.
STS.HS.7.4.c		Demonstrate the use of measurement and math functions/formulas needed to complete job/workplace tasks.

Transportation, Distribution and Logistics Career Cluster

TDL Supply Chain Program of Study

Standard/Indicator Number	STANDARDS	INDICATORS
	THE STUDENT WILL BE ABLE TO...	THE STUDENT WILL BE ABLE TO...
STS.HS.8.1	Apply safety principles, practices and guidelines to the work environment.	
STS.HS.8.1.a		Successfully complete written safety assessment.
STS.HS.8.1.b		Apply the requirements of safety glasses and other Personal Protective Equipment (PPE).
STS.HS.8.1.c		Apply the safe use of tools, machines, and equipment in alignment with industry standards to maintain a safe workplace.
STS.HS.8.1.d		Describe the role of government agencies in providing a safe workplace.
STS.HS.8.2	Investigate career opportunities in the transportation industry.	
STS.HS.8.2.a		Identify the responsibilities and characteristics of professionals in the transportation industry.
STS.HS.8.2.b		Identify employment trends in the transportation industry.
STS.HS.8.2.c		Describe work behaviors needed to be employable.
STS.HS.8.2.d		Identify the training, education, certification and licensing requirements for various careers in the transportation industry.
STS.HS.8.3	Identify the segments and functions of the transportation distribution industry.	
STS.HS.8.3.a		Describe the five modes of transportation used to distribute people and products.

STS.HS.8.3.b		Compare the different types of cargo with the different modes of transportation.
STS.HS.8.3.c		Explain product order processing, product receiving, product storage and retrieval, and product packaging and shipping in the global supply chain logistics life cycle.
STS.HS.8.4	Explain the purpose and components of transportation logistics.	
STS.HS.8.4.a		Explain dispatch and the purpose of tracking of products as they are transported throughout the supply chain.
STS.HS.8.4.b		Describe the components that impact transportation logistics (i.e. routing, scheduling, equipment, operator, etc.).
STS.HS.8.4.c		Explain the different types of shipping documentation and terms.
STS.HS.8.4.d		Describe strategic, tactical and systems planning.